

DISCUSSION OF THE AMENDMENT

Claim 1 has been amended as supported in the specification at page 12, lines 2-5 and 38-41, combined with page 17, lines 13-15. Claim 7 has been amended to be consistent with the above-discussed amendment to Claim 1.

New Claims 11-14 have been added. Claim 11 is supported in the specification at page 12, lines 41-42. Claim 12 is supported in the specification at page 12, lines 45-46. Claim 13 is supported in the specification at page 16, lines 39-43. Finally, Claim 14 is supported in the specification at page 17, lines 7-9.

No new matter is believed to have been added by the above amendment. Claims 1-7 and 9-14 are now pending in the application.

REMARKS

The rejections of Claims 1-2, 5-7 and 9-10 under 35 U.S.C. § 102(e) as anticipated by, and of Claims 3-4 under 35 U.S.C. § 103(a) as unpatentable over, US 6,897,266 (Kenig-Dodiuk), are respectfully traversed.

As recited in above-amended Claim 1, an embodiment of the present invention is a substrate whose surface comprises at least one hyperbranched polymer which has urethane groups and/or urea groups, wherein the hyperbranched polymer is synthesized from AB_x monomers having at least two different functional groups A and B which can react with one another to form a link, either A being an isocyanate group and B being a group which can react with isocyanate groups or vice versa and x is a natural number from 2 to 8, and the hyperbranched polymer is optionally subjected to a polymer-analogous reaction prior to modifying the surface of the substrate.

In contrast to “star polymers” or “dendrimers” of the prior art, and as described in the specification beginning at page 11, line 41, the type of hyperbranched polymers recited in the claims are molecularly or structurally non-unitary, which have side chains of different length and level of branching, and which have a molar mass distribution. Thus, these monomers have at least two different functional groups A and B, which can react with one another to form a link.

It is a disadvantage of star polymers or dendrimers that they are produced from small molecules by way of a reaction sequence which constantly repeats. Thus, every “generation” affords a new reaction step, making the synthesis complicated and expensive. Therefore, real star polymers or dendrimers are usually only synthesized on a laboratory scale.

The hyperbranched polymer of the present claims, on the other hand, has a hyperbranched or non-unitary, skeleton based on urethane and/or urea groups. They can be

used as such where the outer sphere may be subjected to a hydrophilic modification and/or hydrophobic modification by polymer-analogous reaction.

Kenig-Dodiuk is drawn to dendritically modified polyurethane which are obtained by reacting a diisocyanate and/or polyisocyanate with a compound, which is reactive with isocyanate and a hyperbranched polymer, which contains a reactive end group, which can react with an isocyanate functional group (column 2, lines 6-11). Thus, the polymers according to Kenig-Dodiuk are conventional dendrimers (not polyurethanes from AB_x monomers) chain extended with polyurethane chains.

Kenig-Dodiuk neither discloses nor suggests the presently-recited hyperbranched polymer or the claimed substrate whose surface comprises said at least one hyperbranched polymer. Accordingly, it is respectfully requested that these rejections be withdrawn.

The rejections of Claims 1-2, 6-7 and 9-10 under 35 U.S.C. § 102(b) as anticipated by, and of Claims 3-5 under 35 U.S.C. § 103(a) as unpatentable over, US 5,798,418 (Quirk), are respectfully traversed.

The presently-claimed invention and the differences between hyperbranched polymers of the type recited in the present claims and star polymers and dendrimers have been discussed above, which discussion is hereby incorporated by reference. Quirk discloses multi-branched or star-shaped polymers having mixed protected functional and non-functional ends, their optionally hydrogenated analogs, the polymers produced by removal of the protecting groups, and processes to prepare these polymers (column 1, lines 11-15). As confirmed by Quirk, the molecular structure of his compounds can be precisely controlled, i.e., his polymers have an inner sphere that is structurally unitary (paragraph bridging columns 17 and 18). Quirk's star polymers are prepared by living cationic polymerization of unsaturated monomers in the presence of more than one type of initiator (paragraph bridging columns 1 and 2). This leads to star polymers with functional and non-functional branches.

The star polymer itself is not a polyurethane or polyurea, and only the terminal functional groups of the functional branches of the star polymers can be used for further modification, such as by reaction with diisocyanates or polyisocyanates (column 2, line 58 through column 3, line 3). Thus, Quirk neither discloses nor suggests the presently-recited hyperbranched polymer or the claimed substrate whose surface comprises at least said at least one hyperbranched polymer. Accordingly, it is respectfully requested that these rejections be withdrawn.

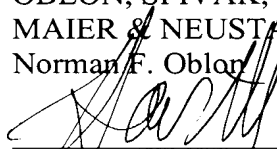
The rejection of Claim 7 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement, is respectfully traversed. The Examiner finds that Claim 7 recites compounds having hydrophobic groups that have no adequate support anywhere in the specification for a meaningful search to be done.

In reply, Claim 7 is an original claim, and constitutes its own written description. *In re Koller*, 613 F.2d 819, 204 USPQ 702 (CCPA 1980). The subject matter of Claim 7 is described in the specification at page 17, lines 13-38. Suitable hydrophobic groups for the compound (B) is described in the specification beginning at page 21, line 21 of the specification. Accordingly, it is respectfully requested that this rejection be withdrawn.

All of the presently-pending claims in this application are now believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

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